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Contents

Introduction

Each section of this document contains the system requirements to implement EtherChannel on the platforms that the document describes. This document also contains a table that describes suggestions for EtherChannel modes between Catalyst switches.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

This document is not restricted to specific software and hardware versions.

Conventions

Refer to the Cisco Technical Tips Conventions for information on document conventions.

Difference Between CatOS and Cisco IOS System Software

CatOS on the Supervisor Engine and Cisco IOS® Software on the Multilayer Switch Feature Card (MSFC) (Hybrid): You can use a CatOS image as the system software in order to run the Supervisor Engine on Catalyst 6500/6000 switches. If you have installed the optional MSFC, use a separate Cisco IOS Software image in order to run the MSFC.

Cisco IOS Software on both the Supervisor Engine and MSFC (Native): You can use a single Cisco IOS Software image as the system software in order to run both the Supervisor Engine and MSFC on Catalyst 6500/6000 switches.

Note: Refer to Comparison of the Cisco Catalyst and Cisco IOS Operating Systems for the Cisco Catalyst 6500 Series Switch for more information.

Design Guidelines

This section lists some of the guidelines to follow when you design a network with EtherChannels.

- Any end of the EtherChannel should be completely on only one device.

  In some modular chassis switches, one end of the EtherChannel can span across the modules of the same chassis. Devices that support this design are:

  - Catalyst 4000/4500 series switches that run Cisco IOS Software
  - Catalyst 6000/6500 series switches that run Cisco IOS Software
  - Catalyst 6000/6500 series switches that run Catalyst OS Software 5.1CSX or later

  In Catalyst 3750 series switches, the EtherChannel can be formed with interfaces across units within a single switch stack. Refer to Cross-Stack EtherChannel on a Catalyst 3750 Switch Configuration Example for more information on Cross-Stack EtherChannel.

- As an EtherChannel cannot terminate on Cisco IP Phones, Cisco recommends to remove any Voice VLAN-related commands from the interfaces/switchports that participate in the EtherChannel.

- In switches that run Cisco IOS, Portchannel interfaces (Layer 3 EtherChannels) can have sub-interfaces in the range of 1 to 4,294,967,293. The actual number of sub-interfaces that can be configured depends on the NVRAM capacity of the switch.

Suggested EtherChannel Modes Between Catalyst Switches

This table describes the suggested EtherChannel modes between Catalyst switches.

Recommended EtherChannel Modes Between nC		Neighboring Catalyst Switch (with Connection to This Switch)					
	6500/6000, 4500/4000, 5500/5000 (Catalyst OS [CatOS])	6500/6000, 4500/4000 (Cisco IOS Software)	2940, 2950, 2955, 2960, 2970, 3550, 3560, 3750	Express 500	2900XL, 3500XL	1900, 2820	2948G-L3, 4908G-L3

Catalyst Platforms						
Local: desirable Neighbor: desirable	Local: desirable Neighbor: desirable	Local: desirable Neighbor: desirable	Local: on Neighbor: Static	Local: on Neighbor: assign port group*	Local: desirable Neighbor: desirable	Local: on Neighbor: See below'

4000R5500ep (CatOS)						
Catalyst 6500 / 6000 Local: desirable Neighbor: desirable	Local: desirable Neighbor: desirable	Local: desirable Neighbor: desirable	Local: on Neighbor: Static	Local: on Neighbor: assign port group*	Local: desirable Neighbor: desirable	Local: on Neighbor: See below[7]

,45000/40000 (Cisco IOS Software) Catalyst 37						
Local: desirable Neighbor: desirable	Local: desirable Neighbor: desirable	Local: desirable Neighbor: desirable	Local: on Neighbor: Static	Local: on Neighbor: assign port group*	Local: desirable Neighbor: desirable	Local: on Neighbor: See below’

50,3560,3550,2970,2960,2955,2950,2940							

Catalyst Express 500						
Local: Static Neighbor: on	Local: Static Neighbor: on	Local: Static Neighbor: on	Local: Static Neighbor: Static	Local: Static Neighbor: assign port group*	Local: Static Neighbor: on	Local: Static Neighbor: See below**

Catalyst 1900, 2820						
Local: desirable Neighbor: desirable	Local: desirable Neighbor: desirable	Local: desirable Neighbor: desirable	Local: on Neighbor: Static	Local: on Neighbor: assign port group*	Local: desirable Neighbor: desirable	Local: on Neighbor: See below**

* The Catalyst 2900XL/3500XL is a Layer 2 switch that does not have an EtherChannel mode. You must assign a port group to the interface in order to configure an EtherChannel.

** The Catalyst 2948G-L3, 4908G-L3, and 4840G are Layer 3 switches and do not have an EtherChannel

mode. The process to configure these switches is similar to the one you use in order to connect a router to a switch and configure the router for port channeling.

System Requirements by Switch Types

Catalyst 6500/6000 Series Switches That Run CatOS

Refer to the support pages for the Catalyst 6500 Series Switches and Catalyst 6000 Series Switches for more information on these switches.

- Catalyst 6500/6000 series switches support EtherChannels on the Ethernet, FastEthernet, Gigabit Ethernet, and the uplink ports on the Supervisor Engine (Active or Standby).
- Catalyst 6500/6000 series switches combine a maximum of eight ports in full duplex. The switches offer 1600 Mbps or 1.6 Gbps throughput for Fast EtherChannel (FEC), and 16 Gbps for Gigabit EtherChannel (GEC).
- With software release 6.3(1) and later releases, the maximum supported number of EtherChannels is 126 for a 6- or 9-slot chassis and 63 for a 13-slot chassis due to how the spanning-tree feature handles port IDs.
- Cross-module EtherChannel support exists with software release 5.1CSX.
- IP address load balancing on FEC or GEC exists with software release 5.2CSX.
- Catalyst 6500/6000 switches with Supervisor Engine I and II support EtherChannels in CatOS 5.1(1)CSX or later.
- Catalyst 6500/6000 series switches with Supervisor Engine 720 support EtherChannels in CatOS 8.1(1) or later.
- Catalyst 6500/6000 series switches with Supervisor Engine 32 support EtherChannels in CatOS 8.4(1) or later.

Catalyst 6500/6000 Series Switches That Run Cisco IOS Software

Refer to the support pages for the Catalyst 6500 Series Switches and Catalyst 6000 Series Switches for more information on these switches.

- Catalyst 6500/6000 series switches that run Cisco IOS Software support both Layer 2 and Layer 3 EtherChannel. Up to eight compatibly configured Ethernet interfaces can exist on any module. All interfaces in each EtherChannel must be the same speed. All interfaces in each EtherChannel must have a configuration as either Layer 2 or Layer 3 interfaces.
- The Ethernet interfaces that participate in an EtherChannel can include both the copper and fiber-optic ports.
- Catalyst 6500/6000 series switches support EtherChannels on the Ethernet, FastEthernet, Gigabit Ethernet on the Supervisor Engine (Active or Standby) and other line modules. Etherchannels are not supported on WAN interfaces.
- An EtherChannel can have an odd number of ports. The minimum number of ports required to form an Etherchannel is two.
- With Release 12.2(18)SXE and later releases, a Catalyst 6500 series switch supports a maximum of 128 EtherChannels. With releases earlier than Release 12.2(18)SXE, a Catalyst 6500 series switch supports a maximum of 64 EtherChannels.
- EtherChannel load balancing can use either MAC addresses, IP addresses, or Layer 4 port number. Also, EtherChannel load balancing can use either source or destination addresses, or both source and

destination addresses. The mode you select applies to all EtherChannels that you have configured on the switch.

- Catalyst 6500/6000 series switches with Supervisor Engine I and II support EtherChannels in Cisco IOS Software Release 12.1E or later.
- Catalyst 6500/6000 series switches with Supervisor Engine 720 support EtherChannels in Cisco IOS Software Release 12.2(14)SX or later.
- Catalyst 6500/6000 series switches with Supervisor Engine 32 support EtherChannels in Cisco IOS Software Release 12.2(18)SX or later.

Catalyst 5500/5000 Series Switches

Refer to the support pages for the Catalyst 5500 Series Switches and Catalyst 5000 Series Switches for more information on these switches.

- Catalyst 5500/5000 series switches support FEC on Supervisor Engine II and III, and on some line cards.
- Catalyst 5500/5000 series switches combine a maximum of eight ports in full duplex. The switches offer 800 Mbps throughput for FEC and 8 Gbps for GEC.
- Catalyst 5500/5000 series switches support EtherChannels in CatOS 2.3(1) or later.
- Support for FEC on the Route Switch Module (RSM) exists as of Cisco IOS Software Release 11.3(5)WA4(8).

Catalyst 4500/4000 Series Switches That Run CatOS

Refer to the support page for the Catalyst 4500 Series Switches and Catalyst 4000 Series Switches (CatOS) for more information on these switches.

- Catalyst 4500/4000 series switches can form an EtherChannel with up to eight compatibly configured Fast Ethernet or Gigabit Ethernet ports on the switch.
- Catalyst 4000 series switches with Supervisor Engine I support EtherChannels in CatOS 4.4(1) or later.
- Catalyst 4500/4000 series switches with Supervisor Engine II support EtherChannels in software release CatOS 4.4(1) or later.

Catalyst 4500/4000 Series Switches That Run Cisco IOS Software

Refer to the support pages for the Catalyst 4500 Series Switches and Catalyst 4000 Series Switches (Cisco IOS Software) for more information on these switches.

- Catalyst 4500/4000 series switches with Supervisor Engine II-Plus, II-Plus-TS, II-Plus-10GE, III, IV, V, and V-10GE that run Cisco IOS Software support both Layer 2 and Layer 3 EtherChannel.
- Catalyst 4500/4000 switches support a maximum of 64 EtherChannels. You can form an EtherChannel with up to eight compatibly configured Ethernet interfaces on any module and across modules in a Catalyst 4500/4000 switch.
- Catalyst 4500/4000 switches support EtherChannels of speed 10 Mbps, 100 Mbps, 1Gbps, and 10 Gbps.
- EtherChannel load balancing can use either MAC addresses, IP addresses, or Layer 4 port number.
- The FEC and GEC can use Inter-Switch Link Protocol (ISL) or IEEE 802.1Q for trunking.
- Catalyst 4500/4000 series switches with Supervisor Engine III or IV support EtherChannels in Cisco IOS Software Release 12.1(8a)EW or later.
- Catalyst 4500/4000 series switches with Supervisor Engine II-Plus support EtherChannels in Cisco IOS Software Release 12.1(19)EW or later.
- Catalyst 4500/4000 series switches with Supervisor Engine V support EtherChannels in Cisco IOS Software Release 12.2(18)EW or later.
- Catalyst 4500 series switches with Supervisor Engine II-Plus-TS support EtherChannels in Cisco IOS Software Release 12.2(20)EWA or later.
- Catalyst 4500 series switches with Supervisor Engine II-Plus-10GE support EtherChannels in Cisco IOS Software Release 12.2(25)SG or later.
- Catalyst 4500 series switches with Supervisor Engine V-10GE support EtherChannels in Cisco IOS Software Release 12.2(25)EW or later.

Catalyst 3750 Series Switches

Refer to the support page for the Catalyst 3750 Series Switches for more information on these switches.

- Catalyst 3750 series switches support both Layer 2 and Layer 3 EtherChannel, with up to eight compatibly configured Ethernet interfaces. All interfaces in each EtherChannel must be the same speed. All interfaces in each EtherChannel must have a configuration as either Layer 2 or Layer 3 interfaces.
- The EtherChannel can be formed with interfaces on any switch and across switches within a single switch stack. Refer to Cross-Stack EtherChannel on a Catalyst 3750 Switch Configuration Example for more information on Cross-Stack EtherChannel.
- The Catalyst 3750 series switches support a maximum of 12 EtherChannels with configuration on a stack if the switch runs Cisco IOS Software Release 12.1. The Catalyst 3750 series switches can support a

maximum of 48 etherchannels on the switch stack if the switch runs Cisco IOS Software Release12.2 or later.

- In order to balance the traffic load across the links in a channel, EtherChannel load balancing can use any of these addresses:

  - MAC addresses or IP addresses

  - source or destination addresses

  - both source and destination addresses

  The default configuration is the forward of source MAC addresses. Refer to Configuring EtherChannel for more information on load balancing on the 3750.

- Catalyst 3750 series switches support EtherChannels in Cisco IOS Software Release 12.1(11)AX or later.

Catalyst 3560 Series Switches

Refer to the support page for the Catalyst 3560 Series Switch for more information on these switches.

- Catalyst 3560 series switches support both Layer 2 and Layer 3 EtherChannel, with up to eight compatibly configured Ethernet interfaces. All interfaces in each EtherChannel must be the same speed. All interfaces in each EtherChannel must have a configuration as either Layer 2 or Layer 3 interfaces.

- For Catalyst 3560 switches, the number of ports of the same type as the EtherChannels limits the number of EtherChannels.

- EtherChannel load balancing can use the forward of either source MAC or destination MAC addresses to balance the traffic load across the links in a channel. The default is the forward of source MAC addresses. When you use the source MAC address forward method, load distribution on the basis of the source and destination IP address is also enabled for routed IP traffic.

- Catalyst 3560 series switches support EtherChannels in Cisco IOS Software Release 12.1(19)EA1 or later.

Catalyst 3550 Series Switches

Refer to the support page for the Catalyst 3550 Series Switch for more information on these switches.

- Catalyst 3550 series switches support both Layer 2 and Layer 3 EtherChannel, with up to eight compatibly configured Ethernet interfaces. All interfaces in each EtherChannel must be the same speed. All interfaces in each EtherChannel must have a configuration as either Layer 2 or Layer 3 interfaces.

- For Catalyst 3550 switches, the number of ports of the same type as the EtherChannels limits the number of EtherChannels.

- EtherChannel load balancing can use the forward of either source MAC or destination MAC addresses to balance the traffic load across the links in a channel. The default is the forward of source MAC addresses. When you use the source MAC address forward method, load distribution on the basis of the source and destination IP address is also enabled for routed IP traffic.

- Catalyst 3550 series switches support EtherChannels in Cisco IOS Software Release 12.1(4)EA1 or later.

Catalyst 2900XL/3500XL Series Switches

Refer to the support pages for the Catalyst 2900XL Series Switches and Catalyst 3500XL Series Switches for more information on these switches.

- Catalyst 2900XL/3500XL series switches support FEC with up to eight ports in a forward port group with source as a basis. These switches also support an unlimited number of ports in a port group with destination as a basis.

- The Catalyst 2900XL/3500XL series switches support a maximum of 12 EtherChannel port groups in the switch.

- In a Cisco GigaStack Gigabit Interface Converter (GBIC) configuration, you cannot use ports on different switches in order to form one EtherChannel. The ports must be on the same switch in order to form the EtherChannel.

- Catalyst 2900XL/3500XL series switches support EtherChannels in Cisco IOS Software Release 11.2(8)SA or later.

Catalyst 2970 Series Switches

Refer to the support page for the Catalyst 2970 Series Switches for more information on these switches.

- Catalyst 2970 series switches support up to eight Layer 2 Ethernet interfaces of the same type and configuration. All of the interfaces in each EtherChannel must be the same speed, duplex, VLANs, and trunking configuration.

- The Catalyst 2970 series switches support a maximum of 12 EtherChannels with configuration on the switch.

- In order to balance the traffic load across the links in a channel, EtherChannel load balancing can use any of these addresses:

  - MAC addresses or IP addresses

  - source or destination addresses

  - both source and destination addresses

  The default configuration is the forward of source MAC addresses. Refer to Configuring EtherChannels for more information on load balancing on the 3750.

- Catalyst 2970 series switches support EtherChannels in Cisco IOS Software Release 12.1(11)AX or later.

Catalyst 2960 Series Switches

Refer to the support page for the Catalyst 2960 Series Switches for more information on these switches.

- Catalyst 2960 series switches support up to eight Layer 2 Ethernet interfaces of the same type and configuration. All of the interfaces in each EtherChannel must be the same speed, duplex, VLANs, and trunking configuration.

- In order to balance the traffic load across the links in a channel, EtherChannel load balancing can use any of these addresses:

  - MAC addresses or IP addresses

  - source or destination addresses

  - both source and destination addresses

  The default configuration is the forward of source MAC addresses. Refer to the document Configuring EtherChannels for more information on load balancing on the 2960.

- Catalyst 2960 series switches support EtherChannels in Cisco IOS Software Release 12.2(25)FX or later.

Catalyst 2950/2955 Series Switches

Refer to the support page for the Catalyst 2950 Series Switches and Catalyst 2955 Series Switches for more information on these switches.

- Catalyst 2950/2955 series switches support FEC with up to eight ports in both a port group that has source as a basis and a port group that has destination as a basis. The default is the forward of source MAC addresses.
- Catalyst 2950/2955 series switches allow up to six port groups. The port groups can all have source as a basis, all have destination as a basis, or be a combination of source and destination bases. All ports in the group must be the same type. For example, the ports must all have source as a basis or all have destination as a basis.
- Catalyst 2950 series switches support EtherChannels in Cisco IOS Software Release 12.0(5.2)WC(1) or later.
- Catalyst 2955 series switches support EtherChannels in Cisco IOS Software Release 12.1(12c)EA1 or later.

Catalyst 2940 Series Switches

Refer to the support page for the Catalyst 2940 Series Switches for more information on these switches.

- Catalyst 2940 series switches support up to eight Layer 2 Ethernet interfaces of the same type and configuration. All the interfaces in each EtherChannel must be the same speed, duplex, VLANs, and trunking configuration.
- The Catalyst 2940 series switches support a maximum of six EtherChannels with eight ports per EtherChannel.
- EtherChannel load balancing can use source or destination MAC addresses to balance the traffic load across the links in a channel. The default configuration is the forward of source MAC addresses.
- Refer to the *Understanding Load Balancing and Forwarding Methods* section of Configuring EtherChannels for more information on EtherChannels on the 2940.
- Catalyst 2940 series switches support EtherChannels in Cisco IOS Software Release 12.1(13)AY or later.

Catalyst Express 500 Series Switches

Refer to the support page for the Catalyst Express 500 Series Switches for more information on these switches.

- Catalyst Express 500 support up to 6 Fast EtherChannel or Gigabit EtherChannel groups.
- EtherChannels can be formed without negotiation or by negotiating using the LACP protocol. Refer to the *Configure EtherChannels* section of Catalyst Express 500 Series Switches Configuration Example for more information on configuring the EtherChannels.
- Catalyst Express 500 series switches support EtherChannels in Cisco IOS Software Release 12.2925)FY or later.

Catalyst 1900/2820 Series Switches

Refer to the support page for the Catalyst 1900/2820 Series Switches for more information on these switches.

- Catalyst 1900/2820 series switches support only two port FECs.
- You can preserve the order of frames or maximize load balancing between the links on the Fast EtherChannel. Refer to Frame Ordering and Load Balancing for more information.
- Catalyst 1900/2820 series switches support EtherChannels in software release 8.00.03 or later Enterprise Edition software.

Catalyst 2948G-L3, 4908G-L3, and 4840G Switches

Refer to the support page for the Catalyst 2948G-L3, and 4908G-L3 Switches for more information on these switches.

- Catalyst 2948G-L3 switch router supports up to 16 FECs with up to four adjacent Fast Ethernet ports per channel and one GEC.
- Catalyst 4908G-L3 switch router supports up to four GECs with up to four Gigabit Ethernet ports per channel.
- Catalyst 2949G-L3 switches support EtherChannels in Cisco IOS Software Release 12.0(7)WX5(15a) or later.
- Catalyst 4908G-L3 switches support EtherChannels in Cisco IOS Software Release 12.0(10)W5(18e) or later.

Catalyst 8500 Series Switch Routers and Cisco 7000 Series Router

- Catalyst 8510 Campus Switch Router (CSR) supports up to four port FECs as one Layer 3 forwarding path.
- Catalyst 8540 CSR supports FEC technology with load balancing.
- Cisco 7500 Series Routers allow from two to four links to be present per FEC with load balancing.
- The Cisco 8500 series supports EtherChannels in Cisco IOS Software Release 12.0(4a)WX5(11a) or later.
- The Cisco 7000 router supports EtherChannels in Cisco IOS Software Release 11.1(14)CA or later.

Related Information

- LAN Product Support
- LAN Switching Support
- Technical Support & Documentation - Cisco Systems

Revision History

Revision	Publish Date	Comments
1.0	11-Jul-2007	Initial Release

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